TM 11-6625-207-10

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

TELETYPEWRITER TEST SET TS-1060/GG

OPERATOR'S MANUAL

HEADQUARTERS, DEPARTMENT OF THE ARMY

JULY 1958

WARNING

High voltage is used in the operation of this equipment. Be careful not to touch the ac input line connections or high voltage connections when working on or near this equipment. Serious injury or death may result from contact with these terminals.

DON'T TAKE CHANCES!

EXTREMELY DANGEROUS POTENTIALS exist in the power supply and the cathode-ray tube circuits of this equipment.

GPO 824–596–1

TECHNICAL MANUAL
No. 11-6625-207-10

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *25 July 1958*

TELETYPEWRITER TEST SET TS-1060/GG

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CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual describes Teletypewriter Test Set TS-1060/GG and covers operation under usual and unusual conditions and operator's maintenance. It includes cleaning and inspection of the equipment and replacement of parts available to first echelon maintenance. Throughout this manual, the main component of the TS-1060/GG is referred to as the *test set* (fig. 1).

b. Maintenance allocation charts are included in TM 11-6625-207-20.

2. Forms and Records

a. Unsatisfactory Equipment Report. Fill out and forward DA Form 468 (Unsatisfactory Equipment Report) to the Commanding Officer, U. S. Army Signal Equipment Support Agency, Fort Monmouth, N. J., as prescribed in AR 700-38.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army).

c. Preventive Maintenance Forms. Prepare DA Form 11-266 (figs. 6 and 7) (Maintenance Check List of Signal Equipment (Test Equipment) in accordance with instructions on the form.

d. Parts List Form. Forward DA Form 2028 (Recommended Changes to DA Technical Manual Parts Lists or Supply Manuals 7, 8, or 9) direct to the Commanding Officer, U. S. Army Signal Equipment Support Agency, Fort Monmouth, N. J., for comments on parts listings in appendix II.

e. Comments on Manual. Forward all other comments on this publication direct to the Commanding Officer, U. S. Army Signal Publications Agency, Fort Monmouth, N. J.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

a. Teletypewriter Test Set TS-1060/GG (fig. 1) is a self-contained portable unit that measures the bias and distortion of start-stop and synchronous telegraph signals. Various types of distortion peculiar to teletypewriter equipment can be measured without interrupting service.

b. The test set can measure distortion of the following telegraph signals operating on 20- or 60-milliampere (ma) neutral circuits or on 30-ma polar circuits:

(1) Baudot start-stop telegraph signals (7.42 unit code).
(2) Start-stop IBM telegraph signals (10.42 unit code).
(3) Synchronous 5UCO telegraph signals (5.0 unit code).

c. Distortion indications are presented in the form of pips displayed within a rectangular pattern on the screen of a cathode-ray tube.

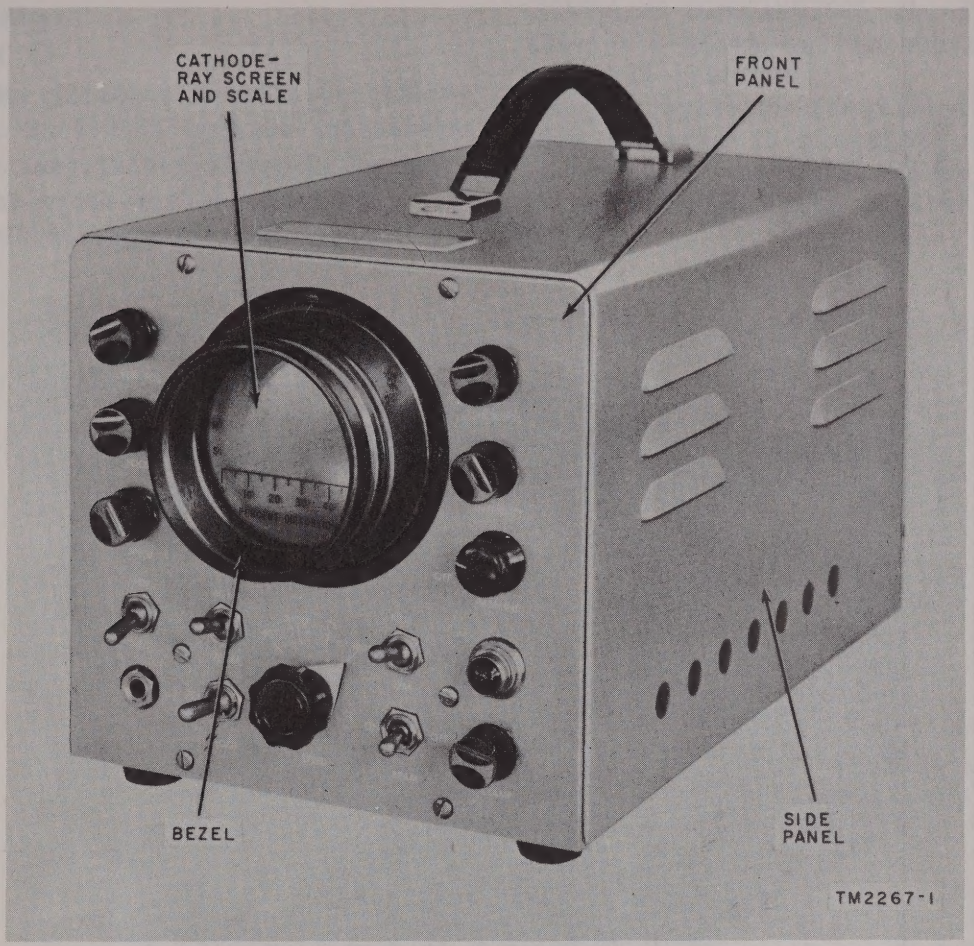


Figure 1. Teletypewriter Test Set TS-1060/GG, less spare parts.

4. Technical Characteristics

Input speeds:

7.42 unit code	60, 75, 100 wpm.
10.42 unit code	Baud speeds equivalent to 60, 75, and 100 wpm.
5.0 unit code	66 wpm (approx.).
Input signal current	60 ma or 20 ma, neutral. 30 ma, polar.
Input impedance	100 ohms for 60-ma neutral.
	300 ohms for 20-ma neutral.
Input impedance	300 ohms for 30-ma polar.
Range of measurement	0% to 50% marking or spacing bias and distortion.
Accuracy	±2% bias.
Indication	Rectangular pattern on 3-inch cathode-ray screen with calibrated scale against screen.
Voltage input	115 or 230 volts ac, 50 to 60 cycles.
Power consumption	45 watts.
Number of tubes	12.

5. Table of Components

Quantity	Item	Dimensions (in.)	Weight (lb)
1	Test set	13¾ × 8 × 8	16
1 Set	Running spares, consisting of:		
	1 incandescent lamp, 6-8 volts (bayonet base)		
	1 electron tube, type 12AT7		
	1 electron tube, type OB2		
	1 electron tube, type 6AL5		
	1 electron tube, type 5963		
	1 electron tube, type 6X4W		
	1 electron tube, type OA2		
	1 electron tube, type 5651		
	1 cathode-ray tube, type 3RP1		
	5 fuses, 2 amperes		

Note. Refer to paragraph 7 for a list of additional equipment required but not supplied.

6. Description

(fig. 1)

a. All the operational controls, the cathode-ray screen, the INPUT jack, and the switches required to adapt the test set for the characteristics of the circuit to be measured are on the front panel. A calibrated scale, marked PERCENTAGE DISTORTION, placed before the screen of a cathode-ray tube indicates the percentage of distortion.

b. Openings on the side panel of the test set allow for access to screwdriver adjustments. Three controls, the FUSE, and the power cord are located on the rear panel of the chassis (fig. 2).

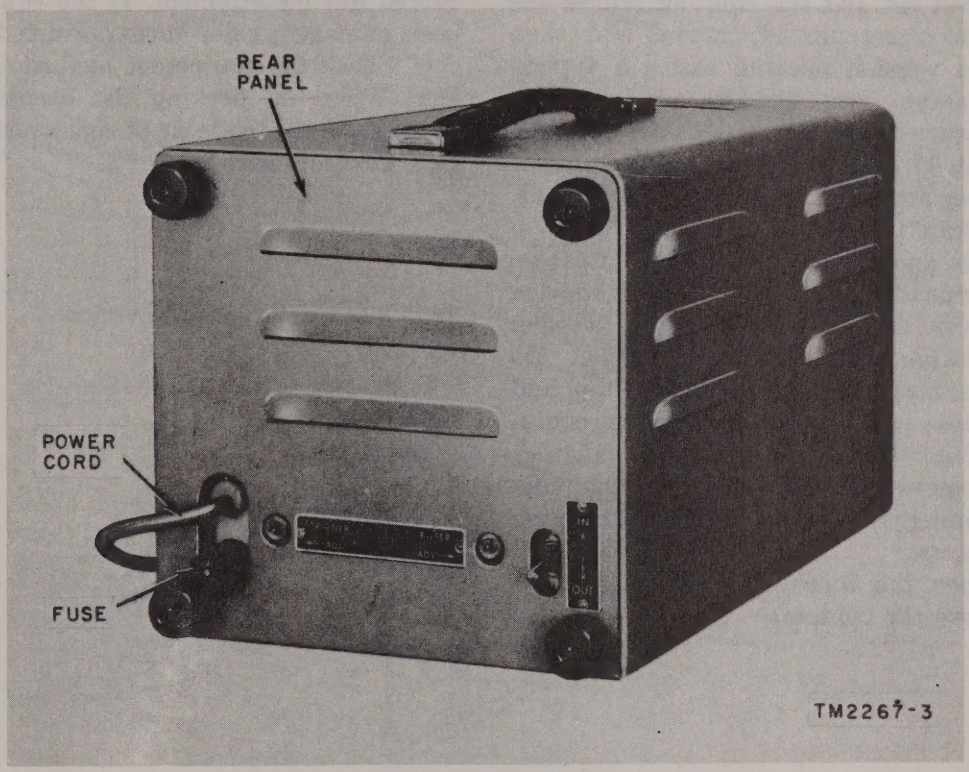


Figure 2. Test set, rear view.

7. Additional Equipment Required

The following equipment is not supplied as part of the test set but is needed for use with the test set.

a. Patch Cord. Cord CC-66 or similar patch cord assembly.

b. Test Signal Source. Distortion Test Set TS-383/GG (TM 11-2217) or equivalent.

CHAPTER 2
SERVICE UPON RECEIPT OF EQUIPMENT

8. Unpacking

a. Packaging Data. When packed for shipment, the test set and the running spares are packaged in a corrugated carton, and then packed in a wooden packing case. A typical wooden packing case and its contents are shown in figure 3. The dimensions are approximately 18 by 17 by 12 inches, with a volume of 2.1 cubic feet and a total weight of 47 pounds.

b. Removing Contents.

(1) Cut and fold back the metal straps.

(2) Remove the nails from the wooden cover and one side of the wooden packing case with a nail puller. Do not attempt to pry off the top and sides; prying may damage the equipment.

(3) Remove the corrugated carton containing the equipment and running spares.

(4) Open the corrugated carton and remove the contents.

9. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, refer to paragraph 2.

b. Check the equipment against the packing list. When no packing list accompanies the equipment, use the table of components (par. 5) as a general check.

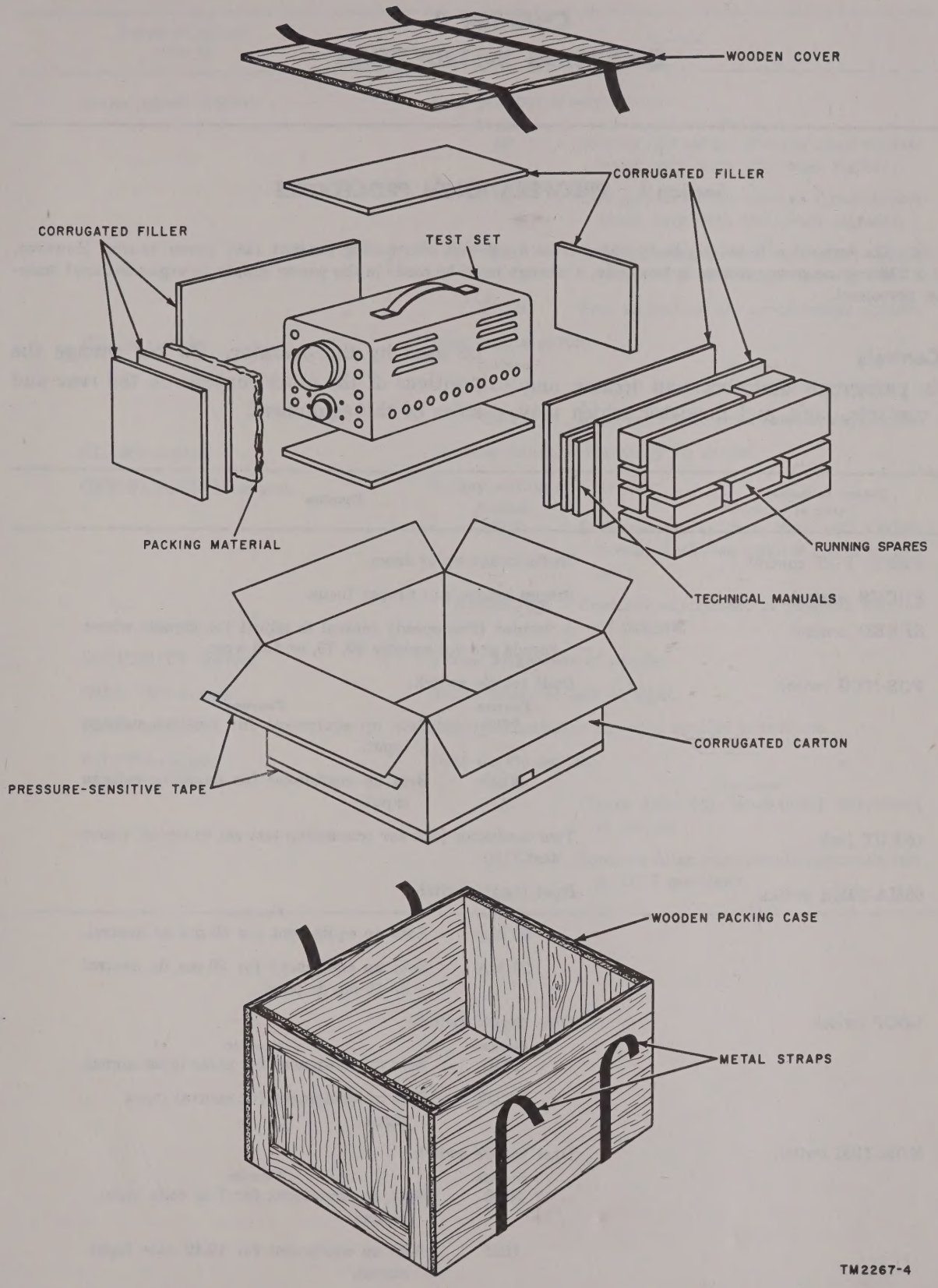


Figure 3. Packaging diagram.

CHAPTER 3
OPERATING INSTRUCTIONS

Section I. PREOPERATIONAL PROCEDURES

Note. The test set will usually be operated from a 115-volt alternating current (ac) power source. However, if only a 230-volt ac power source is available, a change must be made in the power supply by organizational maintenance personnel.

10. Controls

This paragraph describes and locates only those controls, jack, and indicator which may be used by the operator. Do not change the positions of the other controls on the rear and sides of the equipment.

Control or indicator (fig. 4)	Function
VERT. POS control	Shifts image up or down.
FOCUS control	Brings image into proper focus.
SPEED control	A vernier (fine speed) control to adjust for signals whose speeds are not exactly 60, 75, or 100 wpm.
POS-NEG switch	Dpdt toggle switch: *Position* — *Function* POS — Sets up equipment for positive voltage input. NEG — Sets up equipment for negative voltage input.
INPUT jack	Two conductor jack for connecting test set to circuit under test.
60MA-20MA switch	Dpst toggle switch: *Position* — *Function* 60 MA — Sets up equipment for 60-ma dc neutral. 20 MA — Sets up equipment for 20-ma dc neutral or 30-ma dc polar.
LOOP switch	Dpst toggle switch: *Position* — *Function* POL — Sets up equipment for polar input signal. NEUT — Sets up equipment for neutral input signal.
NOR.-IBM switch	Dpst toggle switch: *Position* — *Function* NOR. — Sets up equipment for 7.42 code input signal. IBM — Sets up equipment for 10.42 code input signal.

Control or indicator (fig. 4)	Function
coarse speed control	Four-position rotary switch: *Position* — *Function* 60 — Sets up test set for 60-wpm input signals (used only with start-stop signals). 75 — Sets up test set for 75-wpm input signals (used only with start-stop signals). 100 — Sets up test set for 100-wpm input signals (used only with start-stop signals). 5UC0 — Sets up test set for synchronous signals.
BEAM switch	Dpst toggle switch: *Position* — *Function* ON — Sets up image on cathode-ray screen. OFF — Removes image from cathode-ray screen.
CLAMP control	Steadies image horizontally on screen.
OFF-BASELINE control	Rotary switch and control: *Position* — *Function* OFF — Removes power from test set. (When turned clockwise, applies power to test set.) BASELINE — Provides adjustment of baseline lengths of pattern.
INTENSITY control	Varies brightness of image.
HOR. POS control	Shifts image to left or right.
Power indicator	Red light indicates power is applied to test set.
FILTER switch (fig. 2).	Dpst toggle switch: *Position* — *Function* IN — Places filter (for mechanical distortion) in circuit. OUT — Removes filter from circuit (normally left in OUT position).

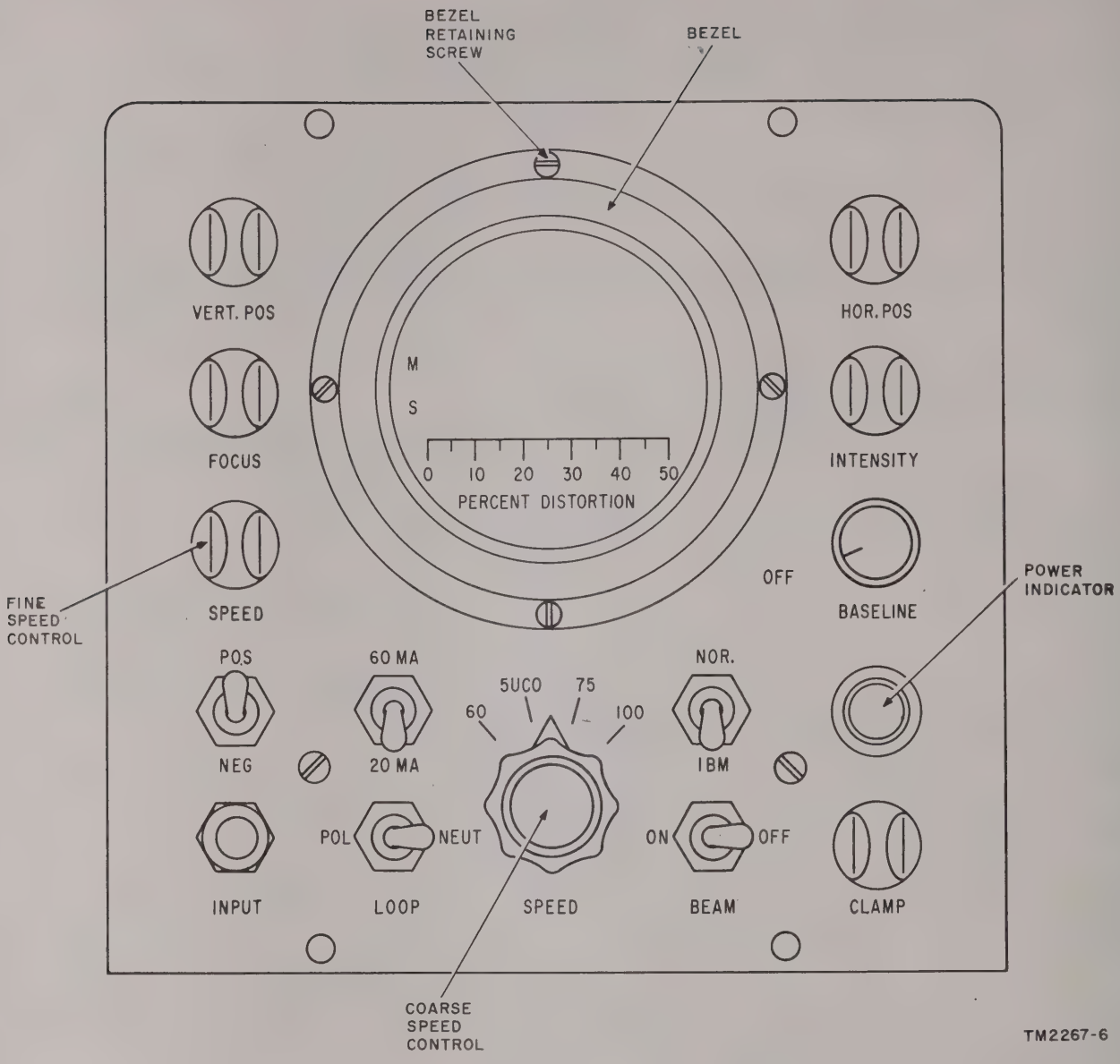


Figure 4. Test Set front panel.

11. Preliminary Procedures

The following preliminary procedures need not be performed each time the test set is used. However, the procedures should be performed whenever the equipment has not been operated for an extended period, such as overnight, or when the equipment has been moved.

a. Starting.

(1) Turn the OFF-BASELINE control (fig. 4) to OFF.

(2) Move the BEAM switch to OFF.

(3) Connect the power cord (fig. 2) to the power source.

(4) Move the FILTER switch to OUT.

(5) Turn the OFF-BASELINE control (fig. 4) clockwise; a click will indicate that power is applied. (The power indicator will glow).

(6) Allow 10 minutes for the equipment to warm up. The cathode-ray screen will be blank (A, fig. 5).

(7) Move the BEAM switch to ON (fig. 4).

(8) Adjust the VERT. POS, HOR. POS, and INTENSITY controls until an image (round green dot) is visible on the screen.

(9) Readjust the VERT. POS and HOR. POS controls until the dot is close to the letter M (B, fig. 5).

Note. Keep the intensity of the dot low. Readjust for high intensity when a signal is applied to the test set.

(10) Adjust the FOCUS control (fig. 4) for a clear dot presentation.

Caution: **Do not let the dot remain stationary on the screen for a long period of time. This may burn a hole on the screen. Turn the BEAM switch to OFF when measurements are not being made.**

b. Adjustments.

(1) Set the TS-383/GG (par. 7) for 60 words per minute, and for the character *Y* with zero distortion (TM 11-2217).

(2) Set the controls of the TS-1060/GG (fig. 4) listed in the left-hand column to the positions indicated in the right-hand column:

Control	Position
POS-NEG switch	POS
60MA-20MA switch	20MA
LOOP switch	NEUT
Coarse speed control	60
NOR.-IBM switch	NOR.
BEAM switch	ON

(3) Connect the output of the TS-383/GG to the INPUT jack of the TS-1060/GG. A rectangular pattern (image) (D, fig. 5) will now appear on the screen of the TS-1060/GG.

Note. The current value of the signal being applied to the TS-1060/GG should be 20 ma.

(4) Adjust the CLAMP control (fig. 4) to steady the pattern if it is moving sideways.

(5) Adjust the INTENSITY and FOCUS controls for maximum clarity of the pattern (pips will appear).

(6) Adjust the OFF-BASELINE and HOR. POS controls until the length of the pattern baselines are equal to the length of the scale (C, fig. 5).

(7) Adjust the fine speed control until the TS-1060/GG is adjusted to the speed of the incoming signal.

Note. Disregard the downward pips when adjusting the fine speed control. The TS-1060/GG is correctly adjusted when the upward pips disappear against line AB (D, fig. 5) or when pips K and L (K, fig. 5) are displaced an equal distance from line AB.

(8) Readjust the CLAMP control (fig. 4) to steady the pattern.

(9) Readjust the OFF-BASELINE and HOR. POS controls for correct baseline length.

(10) Disconnect the output of the TS-383/GG from the TS-1060/GG INPUT jack.

(11) Remove the power from the TS-383/GG.

(12) Turn the BEAM switch and OFF-BASELINE switch to OFF.

Section II. OPERATION UNDER USUAL CONDITIONS

12. Types of Operation

Teletypewriter Test Set TS-1060/GG may be used to make distortion measurements of the following types of telegraph signals:

a. 7.42 unit code start-stop (par. 13).

b. 10.42 unit code start-stop (par. 14).

c. Synchronous (par. 15).

13. Distortion Measurements of 7.42 Code Start-Stop Signals

To make distortion measurements of 7.42 unit code start-stop signals, proceed as follows:

a. Starting.

(1) Turn the OFF-BASELINE control (fig. 4) clockwise; the power indicator will glow. Allow 10 minutes for warmup. Determine from office records, the speed and current characteristics of the loop signal.

(2) Set the coarse speed control to the speed of the signal in the loop under test.

Note. The 5UC0 position is used only with synchronous signals (par. 15).

(3) Set the LOOP switch to match the current characteristics (polar or neutral) of the loop under test.
(4) Connect one end of the patch cord (par. 7) to the INPUT jack.
(5) Set the POS-NEG switch (fig. 4) to the desired polarity.

Note. The POS-NEG switch position should match the potential that will be applied to the tip of the patch cord plug when a circuit is being tested.

b. Operating.

(1) Place the NOR.-IBM switch in the NOR. position.
(2) Turn the BEAM switch to ON; a green dot will appear on the screen next to the letter M (B, fig. 5).
(3) Connect the other end of the patch cord to the circuit under test. If the circuit is being keyed, a rectangular pattern (D, fig. 5) will appear on the screen.
(4) Readjust the CLAMP control (fig. 4) if the pattern appears to be moving sideways.
(5) Readjust the INTENSITY and FOCUS controls for maximum clarity; pips will now appear on the pattern.
(6) Readjust the OFF-BASELINE and HOR. POS controls until the length of the pattern baselines are equal to the length of the scale (C, fig. 5). If necessary, readjust the fine speed control (par. 11*b* (7)).
(7) Read the PERCENT DISTORTION indication on the screen.

Note. For interpretation of screen indications, refer to paragraphs 16 and 17.

c. Stopping.

(1) Disconnect the patch cord from the circuit under test.
(2) Disconnect the patch cord from the test set.
(3) Turn the OFF-BASELINE control (fig. 4) to OFF.
(4) Turn the BEAM switch to OFF.

14. Distortion Measurement of 10.42 Unit Code Start-Stop Signals

To make distortion measurements of 10.42 unit code start-stop signals, proceed as follows:

a. Starting. Follow the starting procedures in paragraph 13*a*.

b. Operating.

(1) Place the NOR.-IBM switch in the IBM position.
(2) Follow the procedures in paragraph 13*b*(2) through (7).

c. Stopping. Follow the stopping procedures in paragraph 13*c*.

15. Distortion Measurement of Synchronous Telegraph Signals

The test set can measure distortion of synchronous telegraph signals when the signal source is from either local-transmit operation or receive-radio telegraph operation.

a. Starting.

(1) Turn the OFF-BASELINE control (fig. 4) clockwise; the power indicator will glow. Allow 10 minutes for warmup.
(2) Connect one end of the patch cord (par. 7) to the INPUT jack.

b. Operating.

(1) Turn the coarse speed control (fig. 4) to the 5UCO position.
(2) Follow the procedures in paragraph 13*b*(2) through (5).

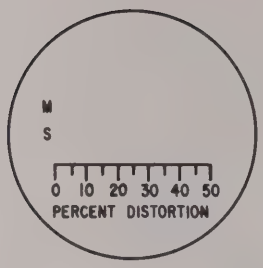
Note. The NOR.-IBM switch may be in either position.

(3) Adjust the fine speed control so that the upward pip on the bottom baseline moves slowly from right to left. The pip will lock in position at the zero percent distortion reference point.

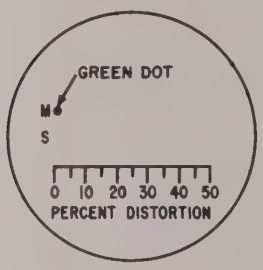
Note. It may be necessary to *ride* the fine speed control to obtain the desired pattern.

(4) Readjust the fine speed control if there is any drift due to fortuitous distortion.
(5) Follow the procedures in paragraph 13*b*(6) and (7).

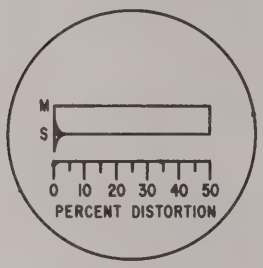
c. Stopping. Follow the procedures in paragraph 13*c*.



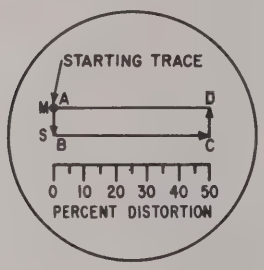
A. CATHODE RAY SCREEN. NO POWER APPLIED.



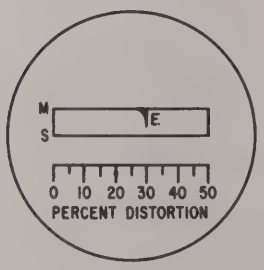
B. POSITIONING THE CATHODE RAY DOT



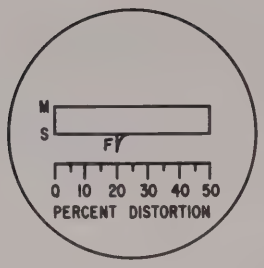
C. TEST SET PROPERLY ADJUSTED PATTERN



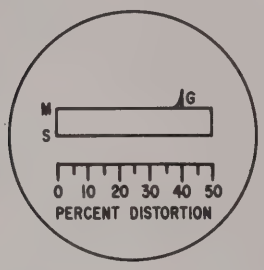
D. FORMATION OF RECTANGULAR PATTERN



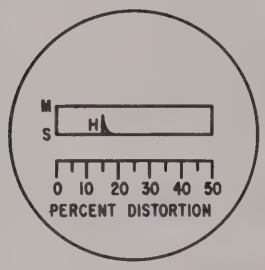
E. INDICATION OF 30% MARKING BIAS DISTORTION



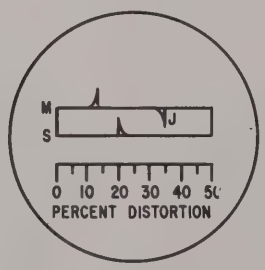
F. INDICATION OF 20% SPACING BIAS DISTORTION



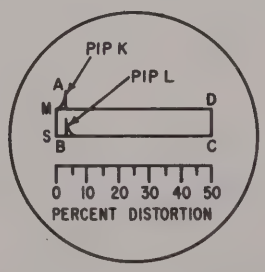
G. INDICATION OF 40% SPACING END DISTORTION



H. INDICATION OF 15% MARKING END DISTORTION



J. 35% PEAK CHARACTERISTIC AND FORTUITOUS DISTORTION



K. ALTERNATE SPEED ADJUSTMENT

Figure 5. Test set screen patterns.

Section III. INTERPRETING SCREEN PATTERNS

16. Types of Distortion

The test set can measure the following types of teletypewriter signal distortion:

a. Bias distortion (par. 17*a*).
b. End distortion (par. 17*b*).
c. Fortuitous distortion (par. 17*c*(1)).
d. Characteristic distortion (par. 17*c*(2)).
e. Mechanical distortion (par. 17*d*).

17. Reading Distortion Measurements

Regardless of whether start-stop (pars. 13 and 14) or synchronous (par. 15) signals are being checked, the distortion indications will be the same on the screen. The percentage of distortion is always indicated by the vertical portion of the pip.

a. Bias Distortion. All indications of bias distortion appear as downward pips on the screen.

(1) *Marking bias distortion.* Marking bias distortion appears on the screen as a downward pip on the top (M) baseline. In E, figure 5, pip E indicates that the percentage of marking bias distortion is 30 percent.

(2) *Spacing bias distortion.* Spacing bias distortion appears on the screen as a downward pip on the bottom (S) baseline. In F, figure 5, pip F indicates that the percentage of spacing bias distortion is 20 percent.

b. End Distortion. All indications of end distortion appear as upward pips on the screen.

(1) *Marking end distortion.* Marking end distortion appears on the screen as an upward pip on the bottom (S) baseline. In H, figure 5, pip H indicates that the marking end distortion is 15 percent.

(2) *Spacing end distortion.* Spacing end distortion appears on the screen as an upward pip on the top (M) baseline. In G, figure 5, pip G indicates that the spacing end distortion is 40 percent.

c. Fortuitous and Characteristic Distortion.

(1) *Fortuitous distortion.* Fortuitous distortion (haphazard electrical interference is instantaneous and results in a rapid, random movement of the pip on either the top or bottom baseline (J, fig. 5).

(2) *Characteristic distortion.* Characteristic distortion (distortion due to the combination of electrical and mechanical features of the circuit under test) is relatively prolonged and results in a rapid, random movement of the pip on either the top or bottom baseline.

d. Mechanical Distortion.

(1) Mechanical distortion (defective keying equipment) usually causes transient spikes or holes in the loop signals. This distortion results in small pips or a series of small spurious pips on either the top or bottom baseline.

(2) When these pips appear on the screen, move the FILTER switch (fig. 2) to the IN position. The pips will then disappear, indicating their mechanical nature.

(3) Another type of mechanical distortion is that caused by dirty or defective commutator segments. When this defect is suspected, individual teletypewriter signals (blank, T, O, M, V, and letters) should be transmitted repeatedly. The pulse will appear on the screen as a steady upward pip and downward pip, on either baseline. The distance between the pips will indicate the width of the defect on the commutator segment.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

18. Operation at Low Temperatures

a. Keep the test set warm and dry.

b. Keep the power on as long as possible.

c. Keep the test set covered when not in use.

d. When the test set has been exposed to cold, it will sweat when brought into a warm room until it reaches room temperature. To minimize sweating, proceed as follows:

(1) Wrap the test set securely in waterproof material, shelter cloths, or other improvised coverings while it is in low temperature area storage.

(2) Transfer the equipment to the room in which it is to be used, but do not unwrap the equipment for about 6 hours. During this time, the test set will reach room temperature and will not be subject to excessive condensation from warm air in the room.

(3) Dry the test set thoroughly before operation. Use a lint-free cloth to remove any condensation that may adhere to the equipment.

(4) Turn on the set to speed the evaporation of any moisture that may remain.

19. Operation in Desert Climates

a. If the test set must be stored out-of-doors in excessively high temperatures or in sandy areas, inclose or shelter it with a cloth or other improvised covering. Tie the covering around the equipment as tightly as possible.

b. Before operating the equipment, carefully remove all dust and grit. Use a damp, clean, lint-free cloth to wipe the cathode-ray screen; dry it with a fresh cloth. Remove sand or grit that has seeped into any moving parts by brushing or washing the affected parts with Cleaning Compound (Federal stock No. 7930-395-9542).

Warning: **Cleaning Compound is flammable and its fumes are toxic. Do not use it near a flame; provide adequate ventilation.**

c. Never tie power cords or other wire connections to tents. Desert areas are subject to sudden wind squalls which may jerk the connections loose or break the lines.

20. Operation in Tropical Climates

When operating in tropical climates, the test set may be installed in tents, huts, or, when necessary, in underground dugouts. When installed below ground or when set up in swampy areas, moisture conditions are more acute than normal. Ventilation is poor and the high relative humidity causes condensation of moisture on the unit whenever the test set temperature becomes lower than the ambient air. To minimize this condition:

a. Keep the power on as long as possible.

b. Keep the test set securely covered.

c. In climates where the humidity is high, use the same precautions as for desert climates (par. 19).

d. Inspect the equipment for, and remove mold, mites, fungus, and corrosion.

CHAPTER 4
MAINTENANCE INSTRUCTIONS

Section I. OPERATOR'S MAINTENANCE

21. Scope of Operator's Maintenance

a. The following is a list of maintenance duties normally performed by the operator of Teletypewriter Test Set TS-1060/GG.

b. Operator's maintenance for the test set consists of the following:

(1) Preventive maintenance (par. 22).
(2) Visual inspection (par. 23).
(3) Operational checklist (par. 24).
(4) Replacement of defective components (pars. 25 and 26).

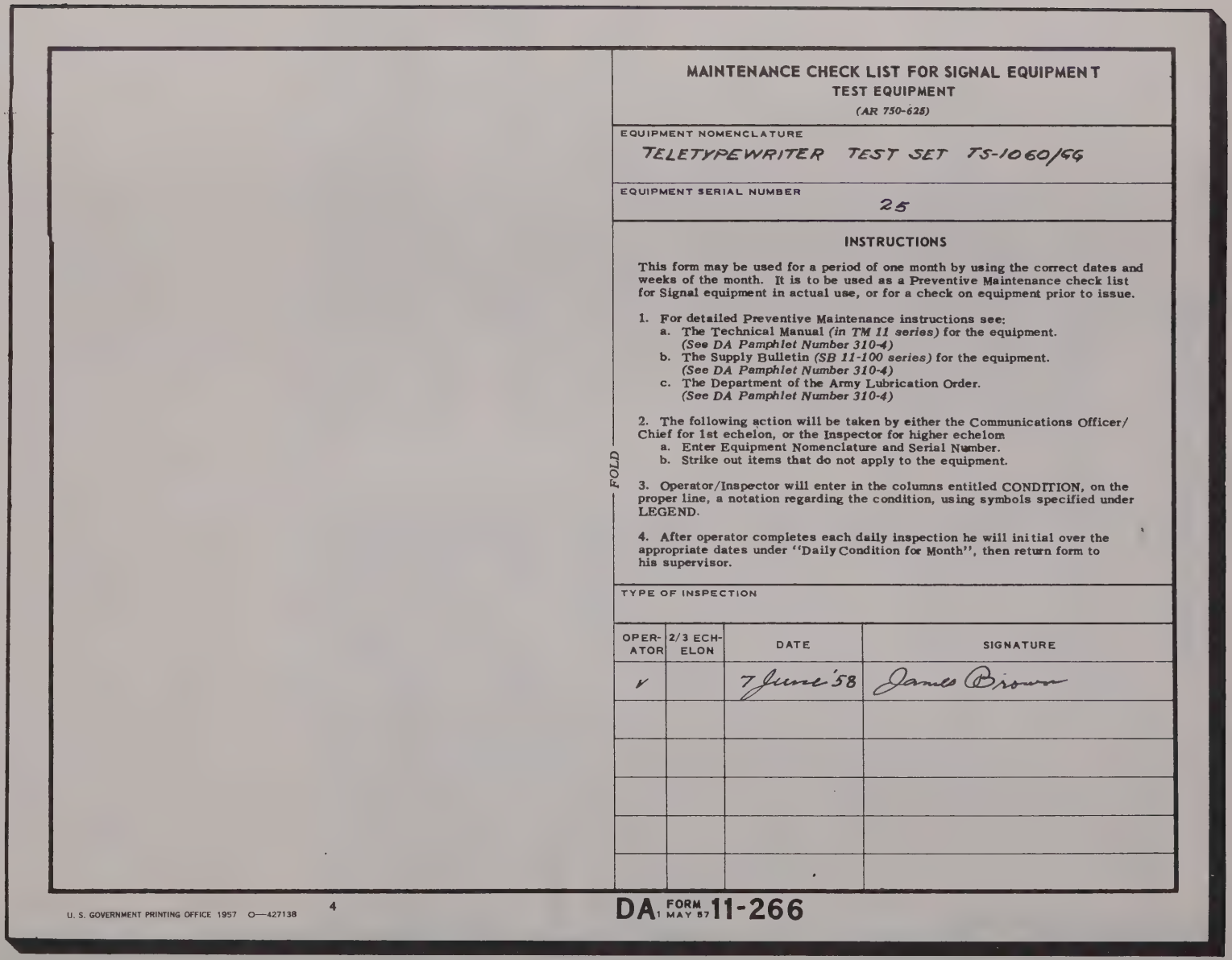
c. The operator of Teletypewriter Test Set TS-1060/GG is limited in his maintenance responsibilities to duties that require no special tools or test equipment. Materials required for maintenance are a lint-free cloth and Cleaning Compound (Federal stock No. 7930-395-9542).

22. Preventive Maintenance

a. DA Form 11-266. DA Form 11-266 (figs. 6 and 7) is a preventive maintenance checklist to be used by the operator. Items not applicable to the test set are lined out on the form. References in the ITEM block in the figures are to paragraphs that contain additional maintenance information pertinent to the particular item. Instruction for the use of the form appears on the form.

b. Items. The information shown in the chart below supplements DA Form 11-266. The item numbers correspond to the ITEM numbers on the form.

Item	Maintenance procedure
1	Use a clean cloth to remove dust, dirt, moisture, and grease from the test set cabinet and front panel controls. If necessary, dampen the cloth with Cleaning Compound and then wipe the parts with a clean dry cloth. *Warning:* Cleaning Compound is flammable and its fumes are toxic. Do not use near a flame; provide adequate ventilation. Remove dirt and moisture from the power cord.
2	All control knobs should work smoothly, be tight on the shafts, and should not bind.
5	Repair defective power cord when no soldering is required. Check the power cord entry into the test set to see that the insulation is not frayed.



MAINTENANCE CHECK LIST FOR SIGNAL EQUIPMENT
TEST EQUIPMENT
(AR 750-625)

EQUIPMENT NOMENCLATURE: TELETYPEWRITER TEST SET TS-1060/GG

EQUIPMENT SERIAL NUMBER: 25

INSTRUCTIONS

This form may be used for a period of one month by using the correct dates and weeks of the month. It is to be used as a Preventive Maintenance check list for Signal equipment in actual use, or for a check on equipment prior to issue.

1. For detailed Preventive Maintenance instructions see:
   a. The Technical Manual *(in TM 11 series)* for the equipment. *(See DA Pamphlet Number 310-4)*
   b. The Supply Bulletin *(SB 11-100 series)* for the equipment. *(See DA Pamphlet Number 310-4)*
   c. The Department of the Army Lubrication Order. *(See DA Pamphlet Number 310-4)*

2. The following action will be taken by either the Communications Officer/ Chief for 1st echelon, or the Inspector for higher echelon
   a. Enter Equipment Nomenclature and Serial Number.
   b. Strike out items that do not apply to the equipment.

3. Operator/Inspector will enter in the columns entitled CONDITION, on the proper line, a notation regarding the condition, using symbols specified under LEGEND.

4. After operator completes each daily inspection he will initial over the appropriate dates under "Daily Condition for Month", then return form to his supervisor.

FOLD

TYPE OF INSPECTION

OPER-ATOR	2/3 ECH-ELON	DATE	SIGNATURE
✓		7 June '58	James Brown

4

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DA FORM 1 MAY 57 11-266

TM2267-13

Figure 6. DA Form 11-266, pages 1 and 4.

LEGEND for marking conditions:
Satisfactory, ✓.
Adjustment, Repair or Replacement required, X.
Defect corrected, (X)

DAILY CONDITION FOR MONTH OF JUNE, 1958

NO.	DAILY ITEM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	2D 3D ECHELON
		17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
1.	CLEAN DIRT AND MOISTURE FROM EXPOSED SURFACES OF ~~HOUSINGS, CASES~~, CABINETS, CONTROL PANELS, INTER-~~CONNECTING PLUGS~~, CABLES, ~~HEADSETS, METER WINDOWS,~~ ETC. PAR. 22b		✓	✓	✓	✓	✓	✓										
2.	INSPECT FOR LOOSENESS OF EXTERIOR ITEMS SUCH AS SWITCHES, KNOBS, JACKS, CONNECTORS AND PILOT LIGHTS. PAR. 22b		✓	✓	✓	✓	✓	✓										
3.	INSPECT CONTROLS FOR BINDING, SCRAPING. TAP CONTROLS LIGHTLY FOR CUT-OUT DUE TO LOOSE CONTACTS.		✓	✓	✓	✓	✓	✓										
4.	DURING OPERATION BE ALERT FOR ANY UNUSUAL PERFORMANCE OR CONDITION. PAR. 23		✓	✓	✓	✓	✓	X										

WEEKLY	CONDITION EACH WEEK 1ST	2D	3D	4TH	5TH	2D 3D ECH
5. INSPECT ~~CORDS~~, CABLES, ~~WIRE AND SHOCK MOUNTS~~ FOR BREAKS, CUTS, KINKS, DETERIORATION, STRAIN AND FRAYING. PAR. 22b	✓					
6. ~~INSPECT CANVAS AND LEATHER ITEMS FOR FUNGUS, FRAYING, TEARS. BROKEN ZIPPERS AND SNAP FASTENERS.~~						
7. HAND CHECK FOR LOOSENESS OF EXTERIOR ITEMS SUCH AS HANDLES, ~~LATCHES, HINGES.~~	✓					
8. ~~INSPECT FOR LUBRICATION IN ACCORDANCE WITH APPLICABLE DA LUBRICATION ORDER.~~						
9. ~~INSPECT DRY BATTERIES FOR DIRT, LOOSE TERMINALS AND LEAKAGE.~~						
10. INSPECT EXPOSED METAL SURFACES FOR RUST AND CORROSION.	✓					
11. ~~INSPECT METERS FOR DAMAGED GLASS AND CASES.~~						

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS	CONDITION
12. ~~INSPECT SEATING OF READILY ACCESSIBLE ITEMS OF A PLUCK-OUT NATURE; CRYSTALS, FUSES, CONNECTORS, PLUG-IN COILS, LAMPS, ETC. DO NOT REMOVE, ROCK OR TWIST TO INSPECT. USE ONLY A DIRECT PRESSURE TO INSURE THE ITEM IS FULLY SEATED.~~	
13. ~~INSPECT FOR CLEANLINESS AND TIGHTNESS OF SUCH ITEMS AS SHOCK MOUNTS, ANTENNA, ANTENNA MOUNTS AND WAVE GUIDES.~~	
14. ~~INSPECT RELAY AND CIRCUIT BREAKER ASSEMBLIES FOR DIRT, CORROSION, WORN OR BURNED CONTACTS.~~	

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS	CONDITION
15. ~~INSPECT RESISTORS, BUSHINGS, INSULATORS FOR CRACKS, CHIPPING, BLISTERING, DISCOLORATION AND MOISTURE.~~	
16. ~~INSPECT JACKS AND CONNECTORS FOR SNUG FIT AND GOOD CONTACTS.~~	
17. ~~INSPECT VARIABLE CAPACITORS FOR DIRT AND MOISTURE.~~	
18. ~~INSPECT AIR FILTERS FOR CLEANLINESS.~~	
19. ~~INSPECT SCREWTYPE TERMINALS OF TRANSFORMERS, FIXED CAPACITORS, RESISTORS, CHOKES, POTENTIOMETERS AND RHEOSTATS FOR CORROSION, DIRT AND LOOSE CONTACTS.~~	
20. ~~CLEAN AND TIGHTEN SWITCHES, BLOWERS, RELAY CASES; CLEAN INTERIOR OF CHASSIS AND CABINETS.~~	
21. ~~INSPECT GENERATORS, MOTORS AND DYNAMOTORS FOR BRUSH WEAR, SPRING TENSION, ARCING AND COMMUTATOR WEAR.~~	
22. ~~INSPECT TERMINAL BLOCKS FOR LOOSE CONNECTIONS, CRACKS AND BREAKS.~~	
23. ~~INSPECT GASKETS AND BUSHINGS FOR WEAR AND DAMAGE.~~	
24. ~~INSPECT CATHODE RAY TUBES FOR BURNED SCREEN SPOTS.~~	
25. ~~BEFORE STORING OR SHIPPING REMOVE ALL BATTERIES.~~	

IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING THE INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION. *(Continue on page 4, if more space is needed)*

ITEM 4. TRIGGER TUBE BROKEN. REPORTED TO HIGHER ECHELON FOR REPLACEMENT

2 3

Figure 7. DA Form 11-266, pages 2 and 3.

23. Visual Inspection

a. When the equipment fails to perform properly, turn the OFF-BASELINE control to OFF and check the items listed below.

(1) Setting of switches and controls (par. 11*a*).
(2) Power cord disconnected or poorly connected.
(3) Patch cord from circuit under test to test set disconnected or poorly connected.
(4) Defective fuse (may indicate other equipment fault).

b. If the above checks do not locate the trouble, proceed to the operational checklist (par. 24).

24. Operational Checklist

a. General. The operational checklist will help the operator to locate trouble quickly. The corrective measures are used to repair this trouble. If the measures suggested do not restore normal equipment performance, trouble-shooting is required by higher echelon repairman. Note on the repair tag what corrective measures were taken and how the equipment performed at the time of failure.

b. Procedure. Operate the test set as described in the checklist in *c* below. Observe the equipment operation and perform any corrective measures necessary.

c. Checklist.

Item No.	Action	Normal indication	Correction
1	Turn OFF-BASELINE control (fig. 4) clockwise.	Power indicator glows.	Check power cord connection to power source. Replace indicator lamp (par. 26*a*). Replace fuse (par. 26*b*). Higher echelon repair required.
2	Turn BEAM control to ON.	Green dot visible on screen (B, fig. 5).	Check positions of controls (par. 11*a*). Replace cathode-ray tube (par. 25). Higher echelon repair required.
3	Set test set controls to the desired positions (par. 11*b* (2)).	Green dot on screen next to letter M.	Replace cathode-ray tube (par. 25). Higher echelon repair required.
4	Connect test set to signal source (par. 11*b*(3)).	Rectangular pattern (D, fig. 5) will appear on screen.	Check positions of controls and switches (items 2 and 3 above).
5	Adjust CLAMP control.	Pattern on screen becomes steady.	Higher echelon repair required.
6	Adjust OFF-BASELINE and HOR. POS controls.	Base lines same length as scale.	Higher echelon repair required.
7	Adjust INTENSITY and FOCUS controls (par. 11b (5)).	Pips appear on trace (D, fig. 5).	Higher echelon repair required.
8	Adjust fine speed control (par. 11*b*(7)).	Pips move to correct position on calibrated scale.	Higher echelon repair required.

25. Replacing Cathode-Ray Tube

If the cathode-ray tube (crt) is broken or defective (par. 24*c*), proceed as follows:

a. Removing Chassis.

(1) To remove the chassis, remove the screws from the front panel (fig. 1) and the bottom (rear) of the cabinet.

(2) Gently pull the chassis out of the front of the cabinet; be careful not to snag the power cord.

b. Replacing Crt.

(1) Unscrew the bezel retaining screws (fig. 4) and remove the bezel.

(2) Remove the scale from the face of the crt.

(3) Gently disengage the tube socket (fig. 8) from the rear of the crt.

(4) Unfasten the retaining ring.

(5) Pull the crt through the magnetic shield.

(6) Insert another crt through the magnetic shield and the open retaining ring. The screen of the crt should extend about ½-inch beyond the front panel.

(7) Close the retaining ring.

(8) Gently replace the tube socket on the base of the tube.

(9) Start the test set (par. 11*a*(1)-(8)).

(10) Rapidly rotate the HOR. POS control (fig. 4) and note if the trace moves horizontally across the screen.

(11) If the trace does not move horizontally across the screen, reposition the crt as follows:

(*a*) Remove the tube socket.

(*b*) Release the retaining ring.

(*c*) Reposition the crt.

(*d*) Repeat the procedures in (7) through (10) above.

Note. It may be necessary to readjust the position of the crt several times before the trace is horizontal.

(12) Shut off the equipment and replace the scale.

(13) Secure the bezel to the front panel with the bezel retaining screws.

(14) Replace and secure the chassis in the cabinet.

26. Replacing Indicator-Lamp, Fuse, and Tubes

a. Replacement of Indicator Lamp.

(1) Turn the OFF-BASELINE control (fig. 4) to OFF.

(2) Remove the red lens from the power indicator.

(3) To loosen the lamp, turn it counterclockwise.

(4) Pull the defective lamp out and replace it with a new one.

(5) Replace the red lens.

b. Replacement of Fuse.

(1) Turn the OFF-BASELINE to OFF.

(2) Disconnect the power cord from the power source.

(3) Remove the knurled cap from the fuse holder (fig. 2).

(4) Replace the defective fuse with another fuse.

(5) Replace the knurled cap.

(6) Connect the power cord to the ac source.

c. Replacement of Tubes (fig. 8). To replace tubes that are obviously defective (cracked or broken), proceed as follows:

Note. Tubes that are not to be changed by the operator are indicated by the note on figure 8. These tubes are to be replaced only at higher echelons that have the equipment required for making circuit adjustments. For replacement of the crt, refer to paragraph 25.

(1) Remove the chassis from the cabinet (par. 25*a*).

(2) Check each tube as follows:

(*a*) Remove the tube shield by turning it counterclockwise until it is released.

(*b*) Remove the tube from the tube socket and check for cracks and broken or bent pins.

(*c*) Replace any defective tube.

(*d*) Replace the tube shield.

(3) Replace and secure the chassis in the cabinet.

Figure 8. Tube location diagram.

CHAPTER 5

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

27. Shipment and Limited Storage

Disassembly and repackaging of Teletypewriter Test Set TS-1060/GG for shipment or limited storage should be performed by second echelon personnel.

28. Demolition to Prevent Enemy Use

a. Authority for Demolition. Demolition of the test set will be accomplished only upon the order of the commander. Use the destruction procedure outlined in *b* below to prevent further use of the equipment.

b. Methods of Destruction.

(1) *Smash.* Smash the chassis, cabinet, tubes, controls, and interior parts. Use sledges, axes, handaxes, pickaxes, hammers, and crowbars.

(2) *Cut.* Cut the power cord and the wiring. Use axes, handaxes, or matchetes.

(3) *Burn.* Burn the technical manuals and other combustible items. Use gasoline, kerosene, flamethrowers, or incendiary grenades.

(4) *Explode.* If explosives are necessary, use firearms, grenades, or TNT.

(5) *Dispose.* Bury or scatter the destroyed parts in slit trenches or foxholes, or throw them into streams.

GPO 824-596-3

APPENDIX I
REFERENCES

Following is a list of applicable references available to the operator of Teletypewriter Test Set TS-1060/GG.

TM 11-655 Fundamentals of Telegraphy (Teletypewriter).

TM 11-664 Theory and Use of Electronic Test Equipment.

TM 11-680 Teletypewriter Circuits and Equipment (Fundamentals).

TM 11-2217 Distortion Test Sets TS-383/GG and TS-383A/GG.

APPENDIX II
BASIC ISSUE ITEMS LIST

Section I. PREFACE

1. General

a. This appendix lists items supplied for initial operation and for running spares and accessories. The list includes tools, accessories, and similar material issued as part of the major end item. This portion lists the basic allowance data for parts and accessories required for maintenance of TEST SET, TELETYPEWRITER TS-1060/GG. These equipments are issued on the basis of allowances prescribed in equipment authorization tables and other documents which are a basis for requisitioning.

b. The list in section II is presented in columns titled as follows:

(1) *FEDERAL OR TECHNICAL SERVICE STOCK NUMBER.* The stock number column lists the 11-digit Federal stock number assigned by the Cataloging Division, OASD(S&L). In the absence of a Federal stock number, the technical service stock number will be used for requisitioning purposes.

(2) *SOURCE CODE.* Repair parts source, maintenance and recoverability code symbols provide information on the use and availability of repair parts according to their functional application. The following are source code repair parts definitions in accordance with AR 700-18.

(*a*) Technical Service Supply Sources Code. 11 indicates a stock Signal Corps part. Refer to AR 310-2 for Technical Service identifying number.

(*b*) The most efficient and practical source or method of supply for the part.

1. Code "P" is applied to repair parts which are high mortality parts; procured by technical services, stocked in and supplied from the technical service depot system, and authorized for use at indicated maintenance echelons.

2. Code "P1" is applied to repair parts which are low mortality parts; procured by technical services, stocked only in and supplied from technical service key depots, and authorized for installation at indicated maintenance echelons.

(*c*) The lowest maintenance echelon authorized to install the repair part.

1. "O" Organizational Maintenance (1st and 2d echelon).
2. "F" Field Maintenance (3d echelon).
3. "H" Field Maintenance (4th echelon).
4. "D" Depot Maintenance (5th echelon).

(*d*) The recoverability aspects of the part. (Will be listed only when applicable).

1. Code "R" Repairable. Applied to repair parts and assemblies which are economically repairable and, when available, are furnished by supply on an exchange basis.
2. Code "S" Salvageable. Applied to repair parts which may be placed in "Ready for Issue" condition by cleaning, replating, anodizing, adjusting, welding, etc.

(3) *DESIGNATION BY MODEL.* This column appears whenever the Section lists parts for two or more models of a particular equipment or when differences in the same model occur. A dagger (†) appearing in the column indicates the model in which the part is used.

(4) *DESCRIPTION.* Nomenclature or the standard item name and brief identifying data for each item is listed in this column. When requisitioning, enter the nomenclature and description on the requisition.

(5) *UNIT OF ISSUE.* The unit of issue is the supply medium by which the individual item is counted for procurement, storage, requisitioning, allowances and issue purposes.

(6) *EXPENDABILITY.* Expendable items are indicated by the letter X; Nonexpendable items are indicated by NX.

(7) *QUANTITY AUTHORIZED.* This column lists the quantities authorized to be kept on hand by the operator for maintenance of the equipment.

(8) *ILLUSTRATION.* The illustration columns refer to either the diagrams or illustrations in which the item appears. References appearing in the Item No. column are a combination of signs or symbols used for identification of the items appearing in illustrations or schematic diagrams shown in another portion of this manual, supplemental circuit labels or technical bulletins.

2.

When this equipment is used by signal service organizations organic to the theater headquarters or communication zones to provide theater communications, those repair parts authorized up to and including fourth echelon are authorized for stockage by the organization operating this equipment.

3. References

A Maintenance Allocation Chart showing all repair operations authorized to be performed by the respective echelons of maintenance appears in TM 11-6625-207-20.

4. Abbreviations

AB	Allen Bradley Co
CRS	cold rolled steel
CTS	Chicago Telephone Supply Co
IRC	International Resistance Co.
ma	milliampere
pri	primary
rms	root mean square
ss	stainless steel
uf	microfarad
uuf	micromicrofarad
vdcw	direct current working volts
wpm	words per minute

5. Comments or Suggestions

Any comments concerning omissions and discrepancies in this appendix will be prepared on DA Form 2028 and forwarded directly to Commanding Officer, U. S. Army Signal Equipment Support Agency, Fort Monmouth, N. J., Attn: SIGFM/ES-ML.

SECTION II. FUNCTIONAL PARTS LIST

(1) FEDERAL OR TECHNICAL SERVICE STOCK NUMBER	(2) REPAIR PARTS SOURCE, MAINTENANCE AND RECOVERABILITY CODE	(3) DESIGNATION BY MODEL	(4) DESCRIPTION	(5) UNIT OF ISSUE	(6) EXPENDABILITY	(7) QUANTITY AUTHORIZED	(8) ILLUSTRATION FIGURE NO.	(9) ILLUSTRATION ITEM NO.
			ITEMS COMPRISING AN OPERABLE EQUIPMENT					
			TEST SET, TELETYPEWRITER TS-1060/GG					
6625-542-6106			TEST SET, TELETYPEWRITER TS-1060/GG: measures bias and distortion and indicates mechanical defects; range, 0 to 50 bias ±2% for bias and distortion; input, 60 or 20 ma neutral, 30 ma polar, 100 ohm and 300 ohm; f/60, 75 and 100 wpm; 10.42 unit code; 115 or 230 v, 50 to 60 cyc, single ph, ac; 13-3/4 in lg x 8 in w x 8 in h; Stelma Model No. TDA-2NB	ea	NX			
			RUNNING SPARES AND ACCESSORY ITEMS					
			TEST SET, TELETYPEWRITER TS-1060/GG					
5960-188-3564			ELECTRON TUBE: MIL type 0A2	ea	X	1		V11
5960-166-7648			ELECTRON TUBE: MIL type 0B2	ea	X	1		V2
5960-188-0862			ELECTRON TUBE: MIL type 3RP1	ea	X	1		V9
5960-188-3544			ELECTRON TUBE: MIL type 6AL5	ea	X	1		V4
5960-188-0880			ELECTRON TUBE: MIL type 6X4W	ea	X	1		V10
5960-166-7662			ELECTRON TUBE: MIL type 12AT7	ea	X	1		V1 V3 V8
5960-167-0389			ELECTRON TUBE: MIL type 5651	ea	X	1		V12
5960-669-6838			ELECTRON TUBE: MIL type 5963	ea	X	1		V5 V6 V7
5920-280-4466			FUSE, CARTRIDGE: ac input line fuse; 2 amp, 250 v; 1-1/4 in lg x 1/4 in dia; Littelfuse part No. 312002	ea	X	5		F1
6240-155-8706			LAMP, INCANDESCENT: 0.15 amp, 6 to 8 v; GE type No. 47	ea	X	1		I1

[AG 413.48 (25 Jun 58)]

By Order of *Wilber M. Brucker*, Secretary of the Army:

MAXWELL D. TAYLOR,
General, United States Army,
Chief of Staff.

Official:

HERBERT M. JONES,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

ASA (2)
CNGB (1)
Technical Stf, DA (1) except
  CSigO (30)
Technical Stf Bd (1)
USCONARC (5)
USA Arty Bd (1)
USA Armor Bd (Incl ea Test Sec) (1)
USA Inf Bd (1)
USA Air Def Bd (Incl ea Test Sec) (1)
USA Abn & Elct Bd (1)
USA Avn Bd (1)
USA Arctic Test Bd (1)
US ARADCOM (Incl ea Rgn Comd) (2)
OS Maj Comd (5)
Log Comd (5)
MDW (1)
Armies (5)
Corps (2)
Div (2)
Ft & Camp (2)
USATC (2)
Svc Colleges (5)
Br Svc Sch (5) except
  USASCS (25)
Gen Depot (2) except
  Atlanta Gen Depot (None)
Sig Sec, Gen Depot (10)
Sig Depot (17)
Trans Terminal Comd (2)
Army Terminal (2)
Port of Emb (OS) (2)
OS Sup Agcy (2)
Sandia Base, AFSWP (5)
Sig Fld Maint Shop (3)
Sig Lab (5)
USA Sig Pub Agcy (8)
Army Pictorial Cen (2)
USASSA (Phila, Pa) (13)
USA White Sands Sig Agcy (13)
USA Elct PG (1)
USA Com Agcy (2)
WRAMC (1)
AMS (1)
Engr Maint Cen (1)
AFIP (1)
USA Sig Com Engr Agcy (1)
Mil Dist (1)
USA Corps (Res) (1)
Sectors, USA Corps (Res) (1)
JBUSMC (2)
Units org under fol TOE:
  11-7 (2)
  11-16 (2)
  11-57 (2)
  11-127 (2)
  11-128 (2)
  11-500 (AA-AG) (2)
  11-557 (2)
  11-587 (2)
  11-592 (2)
  11-597 (2)

NG: State AG (6); units—same as Active Army except allowance is one copy to each unit.

USAR: None.

For explanation of abbreviations used, see AR 320-50.

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